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ABSTRACT

The purpose of this study was to identify the professional horticultural competencies that vocational horticultural teachers must perform successfully and to distinguish between those competencies needed by entry level teachers and those needed by experienced teachers. A secondary purpose was to examine differences in the ratings of the competencies by the teacher sample with regard to selected educational and personal characteristics. Using 256 professional horticultural competencies selected by a search of the ERIC (Educational Resources Information Center) system and research reports from various universities, a survey instrument was constructed. It was administered to all undergraduate agricultural education majors, beginning and experienced horticulture teachers and administrators, and craft committee members in Pennsylvania. Mean scores for each competency were determined for each group. Competencies considered necessary for beginning and experienced teachers in the categories general horticulture, floriculture/greenhouse management, landscape horticulture/nursery management, turf technology, horticulture mechanics and fruits and vegetables were determined. Personal and educational characteristics of respondents did not significantly influence competency ratings. Recommendations for the incorporation of competencies into various levels of vocational horticulture education were made. (Appended are grand means for each competency, references, and the survey instrument.) (MN)

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FINAL REPORT

PROFESSIONAL HORTICULTURE COMPETENCIES FOR ENTRY LEVEL AND EXPERIENCED VOCATIONAL HORTICULTURE TEACHERS IN PENNSYLVANIA

(Contract Number 83-9805)

A. Ronald Attarian

THE PENNSYLVANIA STATE UNIVERSITY
DEPARTMENT OF AGRICULTURAL EDUCATION

UNIVERSITY PARK, PENNSYLVANIA

July 9, 1980

PENNSYLVANIA DEPARTMENT OF EDUCATION

BUREAU OF RESEARCH AND EVALUATION

RESEARCH COORDINATING UNIT
FOR VOCATIONAL EDUCATION

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II. INTRODUCTORY SECTION

Abstract

Pennsylvania Department of Education, Harrisburg, Pennsylvania
School Unit 4-10-14-720-1; Contract No. 83-9805

Professional Horticulture Competencies for Entry Level and Experienced Vocational Horticulture Teachers in Pennsylvania

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The purpose of this study was to identify the professional horticulture competencies that a vocational horticulture teacher must perform successfully, and to distinguish between those competencies needed by an entry level teacher and those competencies needed by an experienced teacher. It also was designed to examine differences in the ratings of the competencies by the teacher sample with regard to selected educational and personal characteristics.

Objectives

1. To determine professional horticulture competencies needed by entry level and experienced vocational teachers as identified by:

a. Undergraduate students in agricultural education and horticulture;
b. Beginning vocational horticulture teachers;
c. Experienced vocational horticulture teachers;
d. Administrators and craft committee members.

2. To determine differences between teacher respondents on the ratings of professional horticulture competencies with regard to: sex, age, educational level, major in college, years of teaching experience, teacher department size, main area of horticulture taught, and years of horticulture work experience.

Outcomes

One-hundred eighty competencies were considered necessary for an entry level vocational horticulture teacher. Two-hundred forty-four competencies were considered necessary for an experienced vocational horticulture teacher. Significant differences in the ratings of the horticulture competencies were observed based on teachers' level of education, undergraduate major in college, size of the vocational agriculture department, and horticulture subject area taught.

Audience

Undergraduate students in agricultural education and horticulture and faculty members at The Pennsylvania State University; vocational horticulture teachers, administrators, and craft committee members in vocational horticulture schools in Pennsylvania.

Publications and Available Materials

1. Final Report.

2. Professional Horticulture Competencies for Entry Level and Experienced Vocational Horticulture Teachers in Pennsylvania, Ph.D. Thesis, The Pennsylvania State University, March 1980.

3. Paper presented at AATEA Regional Meeting, Lancaster, Pennsylvania, May 16, 1980.

Background

Statement of the Problem

The major purpose of this study was to identify the professional horticulture competencies that vocational horticulture teachers must perform successfully, and to distinguish between those competencies needed by an entry level teacher and those competencies needed by an experienced teacher.

A secondary purpose of this study was to examine differences in the ratings of the competencies by the teacher sample with regard to selected educational and personal characteristics.

f. Between those who teach in a single teacher department and those who teach in a multiple teacher department;
g. Between those who teach floriculture/greenhouse management/ horticulture mechanics and those who teach landscape horticulture/nursery management/turf technology/horticulture mechanics;
h. Among groups based on years of horticulture related work experience.

3. There are no significant differences among the perceptions of undergraduate students, beginning teachers, experienced teachers, and administrators and craft committee members regarding the professional horticulture competencies needed by an experienced teacher of vocational horticulture.

4. There are no significant differences in the perceptions of teachers of vocational horticulture regarding the need by experienced vocational horticulture teachers for the professional horticulture competencies:

a. Between males and females;
b. Among age groups;
c. Between those having a bachelor's degree and those having a master's or doctorate degree;
d. Among horticulture majors, agricultural education majors, and dual majors in agricultural education and horticulture;
e. Among groups based on years of teaching experience;
f. Between those who teach in a single teacher department and those who teach in a multiple teacher department;
g. Between those who teach floriculture/greenhouse management/ horticulture mechanics and those who teach landscape horticulture/nursery management/turf technology/horticulture mechanics;
h. Among groups based on years of horticulture related work experience.

Procedures

Development of the Professional Horticulture Competency List

An initial list of professional horticulture competencies potentially needed by vocational horticulture teachers was developed in July 1979. The sources used to develop the list were identified, in part, through the Educational Resources Information Center (ERIC) computer search system. Other competencies were compiled from various publications and research reports including V-TECS and studies from Cornell University, The Ohio State University, and the University of Arizona. Additional sources contacted to identify possible competencies for inclusion in the list were The Pennsylvania State University faculty in the Department of Horticulture and experienced vocational horticulture teachers in the state.

After reviewing the information provided by the above sources, 256 professional horticulture competencies were identified.

Validation of the Professional Horticulture Competency List

The list of professional horticulture competencies was sent with a cover letter to a panel of experts for review and validation. The panel consisted of experienced vocational horticulture teachers in Pennsylvania and The Pennsylvania State University faculty in horticulture. The panel of experts was asked to (1) delete competencies they considered unimportant for a vocational horticulture teacher; (2) add any competencies they considered essential for a vocational horticulture teacher; and (3) evaluate the competency statements for clarity and ease of interpretation and to make changes, if needed.

Development of the Survey Instrument

A survey instrument was constructed from the validated competency list. A demographic data survey instrument was developed to obtain pertinent facts from each respondent. The demographic questions were placed at the beginning of the survey instrument and were followed by the list of professional horticulture competencies.

For each competency in the list, there were two 5-point Likert scales. Respondents were asked to rate the need for each competency for an entry level vocational horticulture teacher on the left scale, and to rate the need for each competency for an experienced vocational horticulture teacher on the right scale. A rating of five (5) was considered very essential; a rating of one (1) was considered not essential. Respondents were asked to circle the corresponding number for each scale.

Pilot Study

The survey instrument was pilot tested in July 1979 with seven undergraduate students in the Department of Agricultural Education at The Pennsylvania State University. The purpose of the pilot study was to note any inherent problems with the survey. The students were asked to respond to the items in the survey instrument without asking questions or discussion with other respondents. This was done to ensure maximum clarity of the survey instrument. Several problems were noted as a result of the pilot test, and the necessary changes were made.

Administration of the Survey Instrument

The survey instrument was mailed on August 3, 1979 directly to all horticulture undergraduate students majoring in agricultural education, all beginning horticulture teachers, and all experienced horticulture teachers in Pennsylvania. Because names and addresses of administrators and craft committee members were unknown, coded survey instruments, cover letters, and stamped envelopes were included with the teacher packets. The teachers were asked to mail or hand deliver these survey instruments to their respective administrators and craft committee members.

Respondents were asked to rate each competency as they perceived its need for an entry level vocational horticulture teacher and for an experienced vocational horticulture teacher to advance in the profession. It was explained that a competency rated high for an entry level teacher logically would be rated equally high or higher for an experienced teacher.

Collection of Data

Two weeks after the initial mailing, a follow-up telephone call was made to undergraduate students and teachers who had not responded. Follow-up letters were sent to those who were unavailable by telephone.

Completed questions were plotted on a rate-of-return graph and checked "received" on a code form to monitor the overall return rate for each group. No returns were keypunched after September 14, 1979. The composition of the sample and the percent returned for each group are shown below.

Sample	Number Surveyed	Number Returned	Percent Returned
Undergraduate Students	30	22	73.3
Beginning Teachers	19	14	73.7
Experienced Teachers	62	35	56.5
Administrators and Craft Committee Members	162	48	29.6
TOTAL	273	119	43.6

IV. STATISTICAL ANALYSES

To analyze data pertaining to objective one, mean scores for each competency were determined for the undergraduate student group, beginning teacher group, experienced teacher group, and administrator and craft committee member group for both an entry level vocational horticulture teacher and for an experienced vocational horticulture teacher. A single classification analysis of variance program was used to analyze the data. The 0.05 level of significance was the critical standard.

Bartlett's Test was used to determine homogeneity of variance. In some cases values were below the critical standard ($p \leq 0.05$). However, differences were still considered to be meaningful, based on the feeling that analysis of variance is sufficiently robust.

When significant F-ratios ($p \leq 0.05$) were noted, a Duncan's Multiple Range Test was used to identify significantly different means.

To analyze data pertaining to objective two, the Pearson Product-Moment Correlation and Student's Unpaired t-test were used. The 0.05 level of significance was chosen as the critical standard.

Statistical analyses used were those contained in the Statistical Package for the Social Sciences.

V. SUMMARY

This study identified 256 professional horticulture competencies that may be needed by entry level and/or experienced vocational horticulture teachers in Pennsylvania. It also was designed to determine competencies that are essential for entry level teachers and those which are essential for experienced teachers.

The sample consisted of undergraduate students in agricultural education and/or horticulture at The Pennsylvania State University, beginning vocational horticulture teachers, experienced vocational horticulture teachers, and administrators and craft committee members from schools offering vocational horticulture in Pennsylvania.

The competencies were placed into five categories: general horticulture, floriculture/greenhouse management, landscape horticulture/nursery management/turf technology, horticulture mechanics, and fruits and vegetables.

Competencies rated 3.00 (on a Likert scale of 1.00 to 5.00) or higher by the total sample were considered essential for a teacher of vocational horticulture.

For an entry level teacher, 46 competencies in the general horticulture category were considered essential. In the floriculture/greenhouse management category, 54 competencies were rated essential. In the landscape horticulture/nursery management/turf technology category, 41 competencies were rated as essential. In the horticulture mechanics category, 29 competencies were rated as essential. In the fruits and vegetables category, ten competencies were rated as essential.

For an experienced teacher, 49 competencies in the general horticulture category were considered necessary. In the floriculture/greenhouse management category, 63 competencies were rated essential. In the landscale horticulture/nursery management/turf technology category, 62 competencies were rated as essential. In the horticulture mechanics category, 60 competencies were rated as essential. In the fruits and vegetables category, 10 competencies were rated as essential.

This study also determined how teacher sex, age, educational level, major in college, years of teaching experience, teacher department size, main area of horticulture taught, and years of horticulture related work experience influenced the rating of the competencies.

Sex, age, years of teaching experience, and years of horticulture related work experience were not significantly related to the teachers' ratings of the competencies.

Educational level, major in college, department size, and main area of horticulture taught were related to the teachers' ratings of the competencies.

VI. CONCLUSIONS

Hypothesis 1--There are no significant differences among perceptions of the undergraduate students, beginning teachers, experienced teachers, and administrators and craft committee members regarding the professional horticulture competencies needed by an entry level teacher of vocational horticulture--was rejected for 69 of the 256 competencies.

Hypothesis 2--There are no significant differences in the perceptions of teachers of vocational horticulture regarding the need by entry level vocational horticulture teachers for the professional horticulture competencies:

a. Between males and females--was rejected for 13 competencies;
b. Among age groups--was rejected for 20 competencies;
c. Between those having a bachelor's degree and those having a master's or doctorate degree--was rejected for 24 competencies;
d. Among horticulture majors, agricultural education majors, and dual majors--was rejected for 72 competencies;
e. Among groups based on years of teaching experience--was rejected for 20 competencies;
f. Between those who teach in a single teacher department and those who teach in a multiple teacher department--was rejected for seven competencies;
g. Between those who teach floriculture/greenhouse management/horticulture mechanics and those who teach landscape horticulture/nursery management/turf technology/horticulture mechanics--was rejected for 117 competencies;
h. Among groups based on years of horticulture related work experience--was rejected for 19 competencies.

Hypothesis 3--There are no significant differences among the perceptions of the undergraduate students, beginning teachers, experienced teachers, and administrators and craft committee members regarding the professional horticulture competencies needed by an experienced teacher of vocational horticulture--was rejected for 64 of the 256 competencies.

Hypothesis 4--There are no significant differences in the perceptions of teachers of vocational horticulture regarding the need by experienced vocational horticulture teachers for the professional horticulture competencies:

a. Between males and females--was rejected for two competencies;
b. Among age groups--was rejected for 16 competencies;
c. Between those having a bachelor's degree and those having a master's or doctorate degree--was rejected for 32 competencies;
d. Among horticulture majors, agriculture education majors, and dual majors--was rejected for 58 competencies;
e. Among groups based on years of teaching experience--was rejected for 16 competencies;
f. Between those who teach in a single teacher department and those who teach in a multiple teacher department--was rejected for 18 competencies;
g. Between those who teach floriculture/greenhouse management/ horticulture mechanics and those who teach landscape horticulture/nursery management/turf technology/horticulture mechanics--was rejected for 47 competencies;
h. Among groups based on years of horticulture related work experience--was rejected for 19 competencies.

Recommendations

Based on the findings and conclusions from this study, the following recommendations are made:

1. The 180 competencies rated 3.00 or higher for entry level vocational horticulture teachers should be incorporated into the horticulture and agricultural education programs at The Pennsylvania State University.

2. The 64 competencies rated 3.00 or higher for experienced vocational horticulture teachers that were not rated 3.00 or higher for an entry level vocational horticulture teacher should be incorporated into the agricultural education inservice programs in the state to enable teachers to advance in the professior of teaching vocational horticulture.

3. Techniques should be developed to measure the performance of undergraduate students in performing the professional horticulture competencies identified in this study.

4. Prior to certification, agricultural education majors at The Pennsylvania State University who are specializing in horticulture should be required to meet established criteria based on the competencies identified in this study.

5. Based on the high ratings of the fruits and vegetables competencies in this study, they should be included in the curricula for vocational horticulture teachers.

6. The author feels that the following protocol should be followed by undergraduate students in horticulture and agricultural education so they may acquire a high proficiency level in these 180 competencies:

   a. Follow a curriculum that includes courses which offer training in the competencies;
   b. Participate in laboratories offered in conjunction with courses;
   c. Participate in conferences, seminars, and student organizations;
   d. Participate in occupational work experience programs;
   e. Attend inservice courses.

7. Faculty members and student advisors should be aware of the 180 competencies so they may cooperatively design a program of study to develop student proficiency.

8. Faculty members who are cognizant of these competencies may want to modify their courses to include training for all students in these professional horticulture competencies.

9. New students should have a list of the 180 competencies so they may see what should be mastered as they progress through college. These competencies are gained not only in the regular school program, but also in extracurricular activities that students experience daily.

Recommendations for Further Study

1. Research should be initiated to identify professional competency needs for beginning and experienced teachers of agriculture/agribusiness education for all taxonomy areas taught in Pennsylvania.

2. A study should be designed to develop an inservice program for experienced vocational horticulture teachers to include those necessary competencies identified in this study.

VII. TABLES

Table 1. List of General Horticulture Competencies for Entry Level Vocational Horticulture Teachers as Perceived by Total Sample. Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Correctly water a plant	4.61
Properly store pesticides	4.58
Appropriately use safety clothing	4.54
Identify common insects	4.49
Select proper attire for handling toxic chemicals	4.48
Know sources of information for identifying plants	4.46
Identify common horticultural tools	4.39
Prepare a pesticide solution	4.39
Repot a plant	4.33
Select ingredients for a soil mix	4.29
Identify and remove diseased plants	4.27
Adjust soil pH	4.27
Prepare a fertilizer solution	4.25
Identify common plant diseases	4.25
Take cuttings from a stock plant	4.25
Apply lime according to a soil test	4.22
Apply a fungicide	4.18
Perform a soil test	4.08
Properly use a fire extinguisher	4.04
Root cuttings of: hardwood, greenwood, and softwood material	4.04
Mist cuttings	4.03
Eradicate a mite infestation	4.00
Essential (3.00-3.99)	
Mix a cubic yard of growing medium	3.99
Identify and correct nutrient deficiency symptoms in a plant	3.99
Space plants in a greenhouse bench or an outdoor bed	3.98
Identify and eliminate plant disorders	3.97
Properly handle crops after harvest	3.96
Identify common garden weeds	3.95
Distinguish abnormal plant growth	3.90
Identify and control plant diseases	3.83
Assist customers with plant sales	3.82
Maintain an up-to-date horticultural library	3.79
Read and reset a maximum-minimum thermometer	3.70
Select topsoil	3.68
Develop crop rotation plans	3.68
Grade horticultural crops	3.65
Stake and tie a plant to a support	3.61
Determine soil temperature	3.60
Control scale insects on ferns	3.52

Table 1. Continued.

Essential (3.00-3.99) (continued)	Grand Mean
Make compost	3.39
Air-layer a plant	3.36
Harvest and properly store seed	3.31
Inventory dry goods	3.28
Refill a fertilizer proportioner stock tank	3.22
Eliminate rodents	3.19
Sterilize soil using methyl bromide	3.01
Somewhat Essential (2.00-2.99)	
Plan a delivery route	2.86
Divide an herbaceous perennial plant	2.56
Make a topiary	2.54

Table 2. List of Floriculture/Greenhouse Management Competencies for Entry Level Vocational Horticulture Teachers as Perceived by Total Sample. Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Transplant a seedling	4.38
Sow a seed flat	4.37
Prepare a seed flat for seeding	4.34
Fertilize a pot plant	4.24
Control heating in a greenhouse	4.23
Label a pot plant	4.23
Pot a rooted mum cutting	4.15
Fumigate a greenhouse	4.11
Unpack and care for a bunch of cut flowers	4.11
Pinch a pot mum	4.08
Control ventilation and cooling in a greenhouse	4.04
Prepare a bench for a cut flower crop	4.02
Essential (3.00-3.99)	
Use hand watering for a crop of pot plants	3.97
Record greenhouse temperatures	3.96
Disbud chrysanthemums	3.94
Control the flowering dates of commercial crops	3.89
Plan a one-year crop rotation for pot plants	3.85
Steam sterilize soil in a greenhouse bench	3.84
Force a bulb crop	3.84
Apply a growth regulator to a pot mum crop	3.82
Apply shade material to greenhouse glass	3.82
Wire a cut flower	3.82
Pull shade cloth over a greenhouse bench	3.81
Make a corsage	3.80
Disinfect an area for transplanting seedlings	3.79
Take a telephone order for flowers	3.77
Harvest carnations	3.75
Plant a bench of carnations	3.71
Make a bow	3.68
Make a symmetrical centerpiece	3.68
Identify 200 flower and vegetable crops	3.66
Sleeve a pot plant	3.66
Grow seedlings under artificial light	3.64
Make an asymmetrical centerpiece	3.63
Control humidity with fans and humidifiers	3.59
Plant 12 kinds of hanging baskets	3.56
Make a dried arrangement	3.51
Precool a bulb crop	3.51
Make a terrarium	3.46
Foil a plant	3.45

Table 2. Continued.

Essential (3.00-3.99) (continued)	Grand Mean
Design a bud vase arrangement	3.44
Set-up a wedding floral order	3.44
Make a showcase display	3.43
Make a window display	3.42
Set-up a Chapin irrigation system for a pot plant crop	3.42
Propagate a fern by division	3.38
Remove shading material from greenhouse glass	3.37
Design a funeral basket or spray	3.34
Measure available light for African violets	3.32
Make a dish garden	3.31
Bunch and wrap cut flowers for shipping	3.27
Dye cut flowers	3.10
Clean a floral refrigerator	3.08
Understand and use cut flowers market reports	3.05
Somewhat Essential (2.00-2.99)	
Paint frames and greenhouse structures	2.96
Service a wedding	2.91
Cut glass panes for a greenhouse	2.85
Repot a cattleya orchid	2.82
Load a delivery truck	2.74
Make a grave blanket	2.58
Hand pollinate a flower for seed production	2.54
Produce a fern crop from spores	2.48
Arrange a fruit basket	2.34

Table 3. List of Landscape Horticulture/Nursery Management/Turf Technology Competencies for Entry Level Vocational Horticulture Teachers as Perceived by Total Sample. Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Recognize when to water plants in the landscape	4.10
Apply a mulch	4.08
Ball and burlap a tree or shrub	4.07
Essential (3.00-3.99)	
Cultivate a flower bed	3.98
Dig a hole for planting a tree	3.95
Plant a flower bed	3.92
Provide winter protection for ornamentals	3.91
Correctly apply lawn seed to a prepared area	3.89
Select plant material for a site	3.86
Remove damaged tree limbs	3.83
Identify common lawn grasses	3.80
Treat a tree wound	3.75
Plant a ground cover	3.73
Plant bulbs outdoors	3.73
Control lawn weeds with an herbicide	3.70
Correctly water a lawn	3.68
Level a seedbed	3.66
Select appropriate grass seed mixtures for a variety of sites	3.64
Fertilize an outdoor rose bed	3.63
Landscape the front of a building	3.62
Inventory nursery stock	3.61
Thin and space nursery stock	3.61
Lay plastic to prevent weeds	3.60
Fertilize a large tree	3.57
Properly mow a lawn	3.57
Plant a lawn	3.56
Control soil erosion	3.50
Make a site analysis for a landscape	3.49
Trim a formal hedge	3.47
Draw landscape plans for a residence	3.46
Spread topsoil	3.45
Bare root a tree	3.44
Renovate a lawn	3.36
Identify 200 nursery plants	3.35
Bud or graft	3.32
Correctly lay sod and maintain it for two weeks	3.22
Aerify a lawn	3.17

Table 3. Continued.

Essential (3.00-3.99) (continued)	Grand Mean
Prune bare-root nursery stock for shipping	3.13
Roll seeded ground	3.10
Stratify woody plant seeds	3.09
Somewhat Essential (2.00-2.99)	
Safeguard trees in urban areas	2.98
"Limb-up" a street tree crop in a nursery	2.98
Remove thatch from a lawn	2.98
Trim a tree for utility clearance	2.97
Make a "family needs" analysis	2.97
Fell and remove a tree	2.96
Cable a weak tree limb	2.95
Maintain a golf green	2.84
Bridge graft a tree for damage repair	2.82
Maintain a golf tee	2.70
Survey a site	2.69
Espalier a tree	2.67
Cut Christmas trees	2.66
Lift and roll sod with a machine	2.56
Climb a tree	2.51
Remove a tree stump	2.48
Reset a cup on a golf green	2.46
Load sod	2.45
Lay brick for a patio	2.40
Establish a tree farm	2.39
Rake a sand trap	2.38
Cord wood	2.05

Table 4. List of Horticulture Mechanics Competencies for Entry Level Vocational Horticulture Teachers as Perceived by Total Sample. Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Operate a pesticide application equipment	4.03
Essential (3.00-3.99)	
Calibrate spray equipment	3.89
Adjust a thermostat	3.83
Adjust a time clock from "long day" to "short day" cycles	3.73
Construct a flower bed	3.73
Perform standard maintenance on a chemical sprayer	3.68
Calibrate and operate a lawn fertilizer spreader	3.67
Adjust a mist system for each developmental stage in a crop of cuttings	3.60
Correctly sharpen a knife	3.56
Calibrate a fertilizer proportioner	3.53
Operate a tractor	3.50
Repair a leaking garden hose	3.35
Sharpen a lawn mower blade	3.35
Lubricate moving parts on machinery	3.32
Operate tillage equipment	3.32
Repair greenhouse benches	3.31
Operate a pH meter	3.28
Calibrate the thermostat of a heating cable	3.28
Install a shade cloth system	3.27
Construct a temporary plastic greenhouse	3.27
Use a soil auger	3.20
Change engine oil and filter	3.15
Adjust a humidstat	3.15
Refuel power units	3.14
Construct a cold frame	3.14
Install a fertilizer proportioner	3.10
Construct greenhouse benches	3.10
Adjust and service belts	3.09
Install a timed lighting system	3.06
Somewhat Essential (2.00-2.99)	
Hitch towed equipment to a tractor	2.98
Construct a compost bin	2.97
Maintain soil shredding equipment	2.95
Operate a solubridge	2.92
Install an engine battery	2.91

Table 4. Continued.

Somewhat Essential (2.00-2.99) (Continued)	Grand Mean
Reglaze window frames	2.89
Replace a faucet washer	2.82
Repair a small gasoline engine	2.82
Repair an extension cord	2.78
Operate a chain saw	2.76
Construct a wintering house for container nursery stock	2.74
Build a lath house	2.69
Install a fan and pad cooling system	2.68
Construct a retaining wall	2.65
Adjust a carburetor	2.65
Regulate carbon dioxide generating equipment	2.61
Maintain an electric motor	2.60
Operate frost control equipment in an orchard	2.55
Connect hydraulic equipment	2.54
Construct a fence	2.54
Install and operate an outdoor irrigation system	2.53
Repair a fence	2.52
Use a block and tackle	2.48
Install a drainage field	2.46
Mix concrete	2.42
Sharpen a tree trimming saw	2.42
Repair an electric switch	2.39
Sweat a copper pipe fitting	2.32
Pour concrete	2.31
Wire an electric circuit	2.30
Service heaters and boilers	2.19
Do acetylene welding	2.18
Repair an electric lawn edger	2.18
Operate a vacuum rake	2.17
Do electric welding	2.09
Install a heat circulating pump	2.04
Install an electric circuit panel	2.02
Not Essential (1.00-1.99)	
Maintain a diesel engine	1.98
Operate a backhoe	1.98
Lay concrete blocks	1.89
Repair a hydraulic system	1.87
Service a delivery truck	1.78

Table 5. List of Fruit and Vegetable Competencies for Entry Level Vocational Horticulture Teachers as Perceived by Total Sample. Grand Means Listed in Rank Order.

Essential (3.00-3.99)	Grand Mean
Plan and plant a vegetable garden	3.93
Prepare an area for a vegetable garden	3.75
Maintain a vegetable garden to successful harvest	3.68
Prune a fruit tree for maximum fruit production	3.66
Identify 24 fruit crops	3.49
Regulate temperature of a cold storage unit	3.34
Prune a grape vine	3.27
Cultivate a small fruit planting	3.18
Prune a dormant bramble	3.09
Thin fruit on a fruit tree	3.02

Table 6. List of General Horticulture Competencies for Experienced Vocational Horticulture Teachers as Perceived by Total Sample.[a] Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Properly store pesticides	4.89
Prepare a pesticide solution	4.89
Select proper attire for handling toxic chemicals	4.83
Identify common insects	4.83
Correctly water a plant	4.82
Identify and control plant diseases	4.80
Appropriately use safety clothing	4.79
Identify common plant diseases	4.77
Apply a fungicide	4.77
Apply lime according to a soil test	4.77
Know sources of information for identifying plants	4.75
Adjust soil pH	4.75
Identify and remove diseases plants	4.74
Take cuttings from a stock plant	4.74
Prepare a fertilizer solution	4.73
Identify and eliminate plant disorders	4.72
Identify and correct nutrient deficiency symptoms in a plant	4.71
Eradicate a mite infestation	4.71
Perform a soil test	4.69
Select ingredients for a soil mix	4.68
Identify common horticultural tools	4.67
Distinguish abnormal plant growth	4.62
Maintain an up-to-date horticultural library	4.58
Repot a plant	4.58
Properly handle crops after harvest	4.56
Root cuttings of: hardwood, greenwood, and softwood material	4.55
Identify common garden weeds	4.55
Mist cuttings	4.55
Mix a cubic yard of growing medium	4.54
Grade horticultural crops	4.49
Space plants in a greenhouse bench or an outdoor bed	4.47
Read and reset a maximum-minimum thermometer	4.43
Assist customers with plant sales	4.40
Stake and tie a plant to a support	4.39
Properly use a fire extinguisher	4.38
Select topsoil	4.35
Determine soil temperature	4.34
Develop crop rotation plans	4.33
*Divide an herbaceous perennial plant	4.28
Control scale insects on ferns	4.27
Refill a fertilizer proportioner stock tank	4.26
Air-layer a plant	4.19
Make compost	4.11

Table 6. Continued.

Most Essential (4.00-5.00) (continued)	Grand Mean
Eliminate rodents	4.10
Harvest and properly store seed	4.08
Essential (3.00-3.99)	
Inventory dry goods	3.91
Sterilize soil using methyl bromide	3.90
*Plan a delivery route	3.59
*Make a topiary	3.55

[a]Competencies having an asterisk (*) were rated above 3.00 (essential) for an experienced vocational horticulture teacher, but not for an entry level vocational horticulture teacher.

Table 7. List of Floriculture/Greenhouse Management Competencies for Experienced Vocational Horticulture Teachers as Perceived by Total Sample.[a] Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Control heating in a greenhouse	4.83
Fumigate a greenhouse	4.78
Sow a seed flat	4.74
Fertilize a pot plant	4.70
Transplant a seedling	4.67
Prepare a seed flat for seeding	4.66
Pot rooted mum cuttings	4.63
Control ventilation and cooling in a greenhouse	4.61
Label a pot plant	4.60
Control the flowering dates of commercial crops	4.60
Unpack and care for a bunch of cut flowers	4.58
Record greenhouse temperatures	4.57
Force a bulb crop	4.55
Apply a growth regulator to a pot mum crop	4.54
Steam sterilize soil in a greenhouse bench	4.54
Prepare a bench for a cut flower crop	4.52
Pinch a pot mum	4.51
Disbud chrysanthemums	4.50
Disinfect an area for transplanting seedlings	4.48
Apply shade material to greenhouse glass	4.47
Plan a one-year crop rotation for pot plants	4.46
Identify 200 flower and vegetable crops	4.45
Make a corsage	4.44
Control humidity with fans and humidifiers	4.42
Use hand watering for a crop of pot plants	4.41
Harvest carnations	4.40
Pull shade cloth over a greenhouse bench	4.37
Grow seedlings under artificial light	4.36
Plant a bench of carnations	4.36
Wire a cut flower	4.34
Make a symmetrical centerpiece	4.27
Make an asymmetrical centerpiece	4.25
Precool a bulb crop	4.25
Make a dried arrangement	4.24
Plant 12 kinds of hanging baskets	4.24
Take a telephone order for flowers	4.22
Set-up a Chapin irrigation system for a pot plant crop	4.21
Sleeve a pot plant	4.19
Make a terrarium	4.16
Make a bow	4.15
Foil a plant	4.13
Set-up a wedding floral order	4.13
Make a showcase display	4.10
Propagate a fern by division	4.09

Table 7. Continued.

Most Essential (4.00-4.00) (continued)	Grand Mean
Measure available light for African violets	4.08
Bunch and wrap cut flowers for shipping	4.05
Design a bud vase arrangement	4.04
Remove shade material from greenhouse glass	4.03
Make a window display	4.03
Make a dish garden	4.00
Design a funeral basket or spray	4.00
Essential (3.00-3.99)	
Understand and use cut flower market reports	3.94
Dye cut flowers	3.76
Clean a floral refrigerator	3.73
*Paint frames and greenhouse structures	3.68
*Cut glass panes for a greenhouse	3.68
*Service a wedding	3.63
*Repot a cattleya orchid	3.61
*Hand pollinate a flower for seed production	3.54
*Arrange a fruit basket	3.50
*Make a grave blanket	3.43
*Load a delivery truck	3.39
*Produce a fern crop from spores	3.22

[a]Competencies having an asterisk (*) were rated above 3.00 (essential) for an experienced vocational horticulture teacher, but not for an entry level vocational horticulture teacher.

Table 8. List of Landscape Horticulture/Nursery Management/Turf Technology Competencies for Experienced Vocational Horticulture Teachers as Perceived by Total Sample.[a] Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Recognize when to water plants in the landscape	4.71
Ball and burlap a tree or shrub	4.71
Correctly apply lawn seed to a prepared area	4.66
Control lawn weeds with an herbicide	4.63
Landscape the front of a building	4.63
Provide winter protection for ornamentals	4.59
Select plant material for a site	4.59
Apply a mulch	4.58
Plant a flower bed	4.57
Plant a ground cover	4.55
Cultivate a flower bed	4.55
Treat a tree wound	4.54
Dig a hole for planting a tree	4.51
Identify 200 nursery plants	4.46
Thin and space nursery stock	4.46
Identify common lawn grasses	4.46
Plant a lawn	4.45
Remove damaged tree limbs	4.45
Select appropriate grass seed mixtures for a variety of sites	4.41
Fertilize a large tree	4.40
Make a site analysis for a landscape	4.38
Plant bulbs outdoors	4.38
Draw landscape plans for a residence	4.37
Trim a formal hedge	4.33
Lay plastic to prevent weeds	4.32
Correctly water a lawn	4.29
Renovate a lawn	4.29
Fertilize an outdoor rose bed	4.28
Bud or graft	4.27
Control soil erosion	4.26
Correctly lay sod and maintain it for two weeks	4.26
Bare root a tree	4.26
Properly mow a lawn	4.23
Level a seedbed	4.23
Inventory nursery stock	4.19
Spread topsoil	4.15
Aerify a lawn	4.13
Fine grade a site	4.09
Prune bare-root nursery stock for shipping	4.08

Table 8. Continued.

Essential (3.00-3.99)	Grand Mean
*Remove thatch from a lawn	3.97
Stratify woody plant seeds	3.95
*Cable a weak tree limb	3.92
*"Limb-up" a street tree crop in a nursery	3.90
*Bridge graft a tree for damage repair	3.90
*Fell and remove a tree	3.85
Roll seeded ground	3.84
*Trim a tree for utility clearance	3.80
*Maintain a golf green	3.77
*Safeguard trees in urban areas	3.76
*Make a "family needs" analysis	3.73
*Espalier a tree	3.71
*Survey a site	3.66
*Maintain a golf tee	3.55
*Lift and roll sod with a machine	3.51
*Cut Christmas trees	3.44
*Remove a tree stump	3.40
*Load sod	3.27
*Reset a cup on a golf green	3.26
*Lay brick for a patio	3.24
*Climb a tree	3.17
*Establish a tree farm	3.15
*Rake a sand trap	3.11
Somewhat Essential (2.00-2.99)	
Cord wood	2.71

[a]Competencies having an asterisk (*) were rated above 3.00 (essential) for an experienced vocational horticulture teacher, but not for an entry level vocational horticulture teacher.

Table 9. List of Horticulture Mechanics Competencies for Experienced Vocational Horticulture Teachers as Perceived by Total Sample.[a] Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Operate pesticide application equipment	4.77
Calibrate spray equipment	4.58
Adjust a thermostat	4.49
Calibrate and operate a lawn fertilizer spreader	4.48
Construct a flower bed	4.48
Perform standard maintenance on a chemical sprayer	4.45
Adjust a mist system for each developmental stage in a crop of cuttings	4.40
Adjust a time clock from "long day" to "short day" cycles	4.39
Calibrate a fertilizer proportioner	4.36
Operate a tractor	4.29
Operate a pH meter	4.27
Install a shade cloth system	4.19
Operate tillage equipment	4.18
Correctly sharpen a knife	4.13
Repair greenhouse benches	4.10
Construct a temporary plastic greenhouse	4.08
Sharpen a lawn mower blade	4.06
Construct a cold frame	4.05
Calibrate the thermostat of a heating cable	4.05
Construct greenhouse benches	4.02
Lubricate moving parts on machinery	4.02
Install a timed lighting system	4.00
Essential (3.00-3.99)	
Install a fertilizer proportioner	3.98
Repair a leaking garden hose	3.96
Use a soil auger	3.91
Adjust a humidistat	3.89
*Construct a wintering house for container nursery stock	3.85
*Repair a small gasoline engine	3.85
Adjust and service belts	3.84
*Construct a compost bin	3.84
Change engine oil and filter	3.83
*Build a lath house	3.78
*Hitch towed equipment to a tractor	3.74
*Operate a chain saw	3.73
*Operate a solubridge	3.72
*Maintain soil shredding equipment	3.72
*Reglaze window frames	3.72
Refuel power units	3.72

Table 9. Continued.

Essential (3.00-3.99) (continued)	Grand Mean
*Regulate carbon dioxide generating equipment	3.68
*Install a fan and pad cooling system	3.63
*Adjust a carburetor	3.60
*Install an engine battery	3.58
*Install and operate an outdoor irrigation system	3.57
*Construct a retaining wall	3.55
*Replace a faucet washer	3.53
*Sharpen a tree trimming saw	3.46
*Operate frost control equipment in an orchard	3.45
*Install a drainage field	3.45
*Repair an extension cord	3.41
*Construct a fence	3.36
*Maintain an electric motor	3.33
*Use a block and tackle	3.31
*Connect hydraulic equipment	3.29
*Mix concrete	3.25
*Sweat a copper pipe fitting	3.21
*Wire an electric circuit	3.18
*Repair a fence	3.14
*Repair an electric switch	3.12
*Pour concrete	3.06
*Repair an electric lawn edger	3.02
Somewhat Essential (2.00-2.99)	
Do acetylene welding	2.97
Operate a vacuum rake	2.93
Service heaters and boilers	2.88
Install a heat circulating pump	2.87
Install an electric circuit panel	2.82
Do electric welding	2.75
Lay concrete blocks	2.75
Operate a backhoe	2.75
Maintain a diesel engine	2.69
Repair a hydraulic system	2.56
Service a delivery truck	2.54

[a]Competencies having an asterisk (*) were rated above 3.00 (essential) for an experienced vocational horticulture teacher, but not for an entry level vocational horticulture teacher.

Table 10. List of Fruit and Vegetable Competencies for Experienced Vocational Horticulture Teachers as Perceived by Total Sample. Grand Means Listed in Rank Order.

Most Essential (4.00-5.00)	Grand Mean
Prepare an area for a vegetable garden	4.53
Maintain a vegetable garden to successful harvest	4.50
Plan and plant a vegetable garden	4.47
Prune a fruit tree for maximum fruit production	4.41
Regulate temperature of a cold storage unit	4.21
Identify 25 fruit crops	4.19
Prune a grape vine	4.17
Cultivate a small fruit planting	4.03
Essential (3.00-3.99)	
Thin fruit on a fruit tree	3.92
Prune a dormant bramble	3.91

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IX. APPENDICES

THE PENNSYLVANIA STATE UNIVERSITY
102 Armsby Building
University Park, Pennsylvania 16802

College of Agriculture
Department of Agricultural Education

Area Code 814
863-0443

23 July, 1979

Dear

Kindly review the attached list of Professional Horticulture Competencies that may be needed by horticulture teachers in Pennsylvania. I would like you to read each competency as it relates to what a vocational horticulture teacher should be able to do so that he/she can teach the skill to students.

Line out any competencies that you feel are unnecessary for a horticulture teacher to know. Feel free to write on the list, and change the wording if you wish.

If you feel that there are competencies that should be included, please write them in the blanks provided at the end of the list.

Thank you for your cooperation.

Sincerely,

A. Ronald Attarian
Teacher of Horticulture

an equal opportunity university

THE PENNSYLVANIA STATE UNIVERSITY
102 Armsby Building
University Park, Pennsylvania 16802

College of Agriculture
Department of Agricultural Education

Area Code 814
863-0443

August 3, 1979

Dear

In an effort to develop a means of effectively preparing new horticulture teachers to teach ALL phases of horticulture and to provide inservice courses for experienced horticulture teachers, I am requesting your assistance.

Kindly take 15 to 20 minutes of your time to help establish what you feel are essential skills that horticulture teachers should know in order to teach successfully in Pennsylvania.

Currently, I am compiling these data for my doctoral dissertation. Time is very critical to this study. I would be most grateful if you would complete the enclosed questionnaire and mail it in the enclosed stamped, pre-addressed envelope by August 17, 1979.

This study will do much to improve the preparation of new horticulture teachers and to develop inservice courses for experienced horticulture teachers.

Thank you for your contributions to this most important study.

Very truly yours,

A. Ronald Attarian, Graduate Student and Teacher of Horticulture

Richard F. Stinson, Professor of Agricultural Education and Horticulture

an equal opportunity university

THE PENNSYLVANIA STATE UNIVERSITY
102 Armsby Building
University Park, Pennsylvania 16802

College of Agriculture
Department of Agricultural Education

Area Code 814
863-0443

August 3, 1979

Dear

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Kindly take 15 to 20 minutes of your time to help establish what you feel are essential skills that horticulture teachers should know in order to teach successfully in Pennsylvania.

Currently, I am compiling this data for my doctoral dissertation. Time is very critical to this study. I would be most grateful if you would complete the enclosed questionnaire and mail it in the enclosed, stamped, pre-addressed envelope by August 17, 1979.

I am also interested in obtaining responses from craft (advisory) committee members and administrators in order to find what they feel is essential for horticulture teachers to know. I have enclosed two stamped envelopes containing questionnaires and cover letters. I would appreciate your writing in the name of your administrator on one envelope and writing in the name of a craft committee member on the other envelope, seal and either hand deliver or mail them. Thank you.

I also would appreciate your making sure they have filled out the questionnaires and mailed them back to me.

Thank you for your contributions to this important study. I hope I haven't asked too much of you, but I do value your feelings about teaching horticulture and I want your iuput to be an integral part of this study. This project will do much to improve the understanding of what teaching horticulture is all about.

Very truly yours,

A. Ronald Attarian
Teacher of Horticulture

Richard F. Stinson, Professor of
Agricultural Education and Horticulture

an equal opportunity university

THE PENNSYLVANIA STATE UNIVERSITY
102 Armsby Building
University Park, Pennsylvania 16802

College of Agriculture
Department of Agricultural Education

Area Code 814
863-0443

August 3, 1979

Dear Sir or Madam:

In an effort to develop a means of effectively preparing new horticulture teachers to teach ALL phases of horticulture and to provide inservice courses for experienced horticulture teachers, I am requesting your assistance.

Kindly take 15 to 20 minutes of your time to help establish what you feel are essential skills that horticulture teachers should know in order to teach successfully in Pennsylvania.

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Thank you for your contributions to this most important study.

Very truly yours,

A. Ronald Attarian
Graduate Student and
Teacher of Horticulture

Richard F. Stinson
Professor of Agricultural
Education and Horticulture

an equal opportunity university

THE PENNSYLVANIA STATE UNIVERSITY
102 Armsby Building
University Park, Pennsylvania 16802

College of Agriculture
Department of Agricultural Education

Area Code 814
863-0443

September 1, 1979

Dear Fellow Hort Teacher:

We sent you a questionnaire to solicit your opinions of how important specific competencies are for beginning and experienced horticulture teachers in Pennsylvania. This study will do much to improve the teacher education programs at Penn State for undergraduates and for inservice teachers.

Since we haven't received your questionnaire, this letter will be a reminder to you. We will be most grateful to receive your response as soon as possible. Data must be analyzed by September 10th.

If you need another copy, or have any questions, please call.

Again, thank you.

Very truly yours,

A. Ronald Attarian
Teacher of Horticulture

Richard F. Stinson
Professor of Agricultural
Education and Horticulture

an equal opportunity university

Questionnaire

Code No. _____
(used to follow-up people not responding)

Horticulture Competencies for Horticulture Teachers in Pennsylvania

Instructions

Items require a check (✓) mark or short answer. PLEASE ANSWER ALL ITEMS ACCURATELY! ALL information will be held in strict confidence. Your name will not be used; only code numbers will be used to tabulate data.

Please return the COMPLETED form in the enclosed stamped, pre-addressed envelope immediately. Thank you.

1. CURRENT status:

____ undergraduate in agricultural education
____ undergraduate dual major in agricultural education & horticulture
____ teacher, 1-3 years experience as a horticulture teacher
____ teacher, 4 or more years experience as a horticulture teacher
____ administrator
____ craft (advisory) committee member
____ other (specify) _____

2. Sex:

____ male
____ female

3. Age:

____ years (write in)

4. Highest degree attained:

____ high school diploma
____ bachelors degree
____ masters degree
____ doctoral degree

5. Years of non-teaching work in a horticulture-related industry:

____ years (write in)

Undergraduates, Administrators, and Craft Committee Members, do not respond to the following questions. PLEASE TURN TO NEXT SECTION

Teachers, continue on to the next page ...

6. Major in highest degree attained:

____ agricultural education
____ horticulture
____ other (specify) _____

7. Years of teaching horticulture:

____ years (write in number of years)

8. Do you currently teach in a:

____ single teacher department
____ multiple teacher department

9. Check the main area of horticulture that you currently teach:

____ floriculture, greenhouse management, horticulture mechanics
____ landscape horticulture, nursery production, turf technology, horticulture mechanics
____ other (specify) _____

10. Indicate the number of periods you teach horticulture per week:

____ (periods)

11. Name, address, and phone number of the administrator who filled out the questionnaire:

_____ (name)
_____ (address)
_____
_____ - _____ (phone)

12. Name, address, and phone number of the craft committee member who filled out the questionnaire:

_____ (name)
_____ (address)
_____
_____ - _____ (phone)

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HORTICULTURE COMPETENCY RATING

INSTRUCTIONS: Rate each competency from 5 (most essential) through 1 (not needed) as you perceive its worth for an entry level teacher (left side) AND as you perceive its worth for an experienced teacher (right side) who has taught for 4 or more years. NOTE: Your selections should reflect what you feel are competencies that a new horticulture teacher must know to teach, and that an experienced horticulture must know to advance in the profession. DO NOT rate as high (5) competencies that would be "nice to know."

CIRCLE the number that indicates your perception of how necessary (or unnecessary) it is.

EXAMPLES TAKEN FROM AN ANIMAL SCIENCE CURRICULUM:

Preservice Teacher MOST ESSENTIAL / NOT NEEDED					PROFESSIONAL AN. SCI. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	(4)	3	2	1	Clip a cow	(5)	4	3	2	1
5	4	3	2	(1)	Artificially inseminate a cow	(5)	4	3	2	1

Note that in the first example, 4 was circled for an entry level teacher (preservice), indicating that the respondent considers this to be a rather essential competency for a new teacher to know how to perform. The respondent circled 5 under the inservice category, indicating that he/she feels the competency is most essential for an experienced teacher to know how to perform. For the second example, 1 was circled for an entry level teacher because it is considered not needed by a new teacher, but the 5 in the inservice category indicates that the respondent considers it to be most essential for an experienced teacher.

BEGIN RATING:

Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Correctly water a plant	5	4	3	2	1
5	4	3	2	1	Refill a fertilizer proportioner stock tank	5	4	3	2	1
5	4	3	2	1	Identify 200 nursery plants	5	4	3	2	1
5	4	3	2	1	Arrange a fruit basket	5	4	3	2	1
5	4	3	2	1	Prepare a pesticide solution	5	4	3	2	1

*competencies are randomized for analysis purposes

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Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Correctly apply lawn seed to a prepared area	5	4	3	2	1
5	4	3	2	1	Mix a cubic yard of growing medium	5	4	3	2	1
5	4	3	2	1	Prepare a fertilizer solution	5	4	3	2	1
5	4	3	2	1	Stake and tie a plant to a support	5	4	3	2	1
5	4	3	2	1	Identify and control plant diseases	5	4	3	2	1
5	4	3	2	1	Operate a pH meter	5	4	3	2	1
5	4	3	2	1	Repot a plant	5	4	3	2	1
5	4	3	2	1	Transplant a seedling	5	4	3	2	1
5	4	3	2	1	Remove thatch from a lawn	5	4	3	2	1
5	4	3	2	1	Operate pesticide application equipment	5	4	3	2	1
5	4	3	2	1	Operate a tractor	5	4	3	2	1
5	4	3	2	1	Properly use a fire extinguisher	5	4	3	2	1
5	4	3	2	1	Repair a small gasoline engine	5	4	3	2	1
5	4	3	2	1	Properly mow a lawn	5	4	3	2	1
5	4	3	2	1	Install an electric circuit panel	5	4	3	2	1
5	4	3	2	1	Correctly lay sod and maintain it for two weeks	5	4	3	2	1
5	4	3	2	1	Prune bare-root nursery stock for shipping	5	4	3	2	1
5	4	3	2	1	Service a delivery truck	5	4	3	2	1
5	4	3	2	1	Plant a lawn	5	4	3	2	1
5	4	3	2	1	Trim a formal hedge	5	4	3	2	1
5	4	3	2	1	Disinfect an area for transplanting seedlings	5	4	3	2	1
5	4	3	2	1	Lay concrete blocks	5	4	3	2	1
5	4	3	2	1	Perform a soil test	5	4	3	2	1
5	4	3	2	1	Steam sterilize soil in a greenhouse bench	5	4	3	2	1
5	4	3	2	1	Operate tillage equipment	5	4	3	2	1
5	4	3	2	1	Operate a chain saw	5	4	3	2	1
5	4	3	2	1	Sharpen a tree trimming saw	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Landscape the front of a building	5	4	3	2	1
5	4	3	2	1	Control lawn weeds with an herbicide	5	4	3	2	1
5	4	3	2	1	Prepare an area for a vegetable garden	5	4	3	2	1
5	4	3	2	1	Select proper attire for handling toxic chemicals	5	4	3	2	1
5	4	3	2	1	Espalier a tree	5	4	3	2	1
5	4	3	2	1	Hand pollinate a flower for seed production	5	4	3	2	1
5	4	3	2	1	Air-layer a plant	5	4	3	2	1
5	4	3	2	1	Bridge graft a tree for damage repair	5	4	3	2	1
5	4	3	2	1	Make a topiary (plant trimmed into a shape)	5	4	3	2	1
5	4	3	2	1	Propagate a fern by division	5	4	3	2	1
5	4	3	2	1	Construct a flower bed	5	4	3	2	1
5	4	3	2	1	Fine grade a site	5	4	3	2	1
5	4	3	2	1	Fertilize a pot plant	5	4	3	2	1
5	4	3	2	1	Lubricate moving parts on machinery	5	4	3	2	1
5	4	3	2	1	Adjust and service belts	5	4	3	2	1
5	4	3	2	1	Repair an electric lawn edger	5	4	3	2	1
5	4	3	2	1	Maintain an electric motor	5	4	3	2	1
5	4	3	2	1	Install and operate an outdoor irrigation system	5	4	3	2	1
5	4	3	2	1	Plan and plant a vegetable garden	5	4	3	2	1
5	4	3	2	1	Treat a tree wound	5	4	3	2	1
5	4	3	2	1	Regulate carbon dioxide generating equipment	5	4	3	2	1
5	4	3	2	1	Adjust a carburetor	5	4	3	2	1
5	4	3	2	1	Unpack and care for a bunch of cut flowers	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL				NOT NEEDED	*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL				NOT NEEDED
5	4	3	2	1	Apply a fungicide	5	4	3	2	1
5	4	3	2	1	Make a corsage	5	4	3	2	1
5	4	3	2	1	Sterilize soil using methyl bromide	5	4	3	2	1
5	4	3	2	1	Select ingredients for a soil mix	5	4	3	2	1
5	4	3	2	1	Make a grave blanket	5	4	3	2	1
5	4	3	2	1	Perform standard maintenance on a chemical sprayer	5	4	3	2	1
5	4	3	2	1	Pot rooted mum cuttings	5	4	3	2	1
5	4	3	2	1	Harvest carnations	5	4	3	2	1
5	4	3	2	1	Mist cuttings	5	4	3	2	1
5	4	3	2	1	Prepare a bench for a cut flower crop	5	4	3	2	1
5	4	3	2	1	Sow a seed flat	5	4	3	2	1
5	4	3	2	1	Wire an electric circuit	5	4	3	2	1
5	4	3	2	1	Pinch a pot mum	5	4	3	2	1
5	4	3	2	1	Apply a mulch	5	4	3	2	1
5	4	3	2	1	Make compost	5	4	3	2	1
5	4	3	2	1	Apply a growth regulator to a pot mum crop	5	4	3	2	1
5	4	3	2	1						
5	4	3	2	1	Foil a plant	5	4	3	2	1
5	4	3	2	1	Pull a shade cloth over a greenhouse bench	5	4	3	2	1
5	4	3	2	1	Apply shade material to greenhouse glass	5	4	3	2	1
5	4	3	2	1	Build a lath house	5	4	3	2	1
5	4	3	2	1	Survey a site	5	4	3	2	1
5	4	3	2	1	Draw landscape plans for a residence	5	4	3	2	1
5	4	3	2	1	Maintain a diesel engine	5	4	3	2	1
5	4	3	2	1	Adjust a humidistat	5	4	3	2	1
5	4	3	2	1	Select plant material for a site	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Fell and remove a tree	5	4	3	2	1
5	4	3	2	1	Use block and tackle	5	4	3	2	1
5	4	3	2	1	Dig a hole for planting a tree	5	4	3	2	1
5	4	3	2	1	Cut glass panes for a greenhouse	5	4	3	2	1
5	4	3	2	1	Grade horticultural crops	5	4	3	2	1
5	4	3	2	1	Determine soil temperature	5	4	3	2	1
5	4	3	2	1	Construct a retaining wall	5	4	3	2	1
5	4	3	2	1	Force a bulb crop	5	4	3	2	1
5	4	3	2	1	Apply lime according to a soil test	5	4	3	2	1
5	4	3	2	1	Cultivate a flower bed	5	4	3	2	1
5	4	3	2	1	Take cuttings from a stock plant	5	4	3	2	1
5	4	3	2	1	Remove a tree stump	5	4	3	2	1
5	4	3	2	1	Bud or graft	5	4	3	2	1
5	4	3	2	1	Repot a cattleya orchid	5	4	3	2	1
5	4	3	2	1	Divide an herbaceous perennial plant	5	4	3	2	1
5	4	3	2	1	Control heating in a greenhouse	5	4	3	2	1
5	4	3	2	1	Fumigate a greenhouse	5	4	3	2	1
5	4	3	2	1	Harvest and properly store seed	5	4	3	2	1
5	4	3	2	1	Ball and burlap a tree or shrub	5	4	3	2	1
5	4	3	2	1	Bunch and wrap cut flowers for shipping	5	4	3	2	1
5	4	3	2	1	Paint frames and greenhouse structures	5	4	3	2	1
5	4	3	2	1	Replace a faucet washer	5	4	3	2	1
5	4	3	2	1	Reglaze window frames	5	4	3	2	1
5	4	3	2	1	Thin and space nursery stock	5	4	3	2	1
5	4	3	2	1	Lay plastic to prevent weeds	5	4	3	2	1
5	4	3	2	1	Cut Christmas trees	5	4	3	2	1
5	4	3	2	1	Install a drainage field	5	4	3	2	1
5	4	3	2	1	Thin fruit on a fruit tree	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Identify and eliminate plant disorders	5	4	3	2	1
5	4	3	2	1	Roll seeded ground	5	4	3	2	1
5	4	3	2	1	Select topsoil	5	4	3	2	1
5	4	3	2	1	Level a seedbed	5	4	3	2	1
5	4	3	2	1	Lift and roll sod with a machine	5	4	3	2	1
5	4	3	2	1	Make an asymmetrical centerpiece	5	4	3	2	1
5	4	3	2	1	Load sod	5	4	3	2	1
5	4	3	2	1	Remove shade material from greenhouse glass	5	4	3	2	1
5	4	3	2	1	Repair an electric switch	5	4	3	2	1
5	4	3	2	1	Sweat a copper pipe fitting	5	4	3	2	1
5	4	3	2	1	Adjust a thermostat	5	4	3	2	1
5	4	3	2	1	Record greenhouse temperatures	5	4	3	2	1
5	4	3	2	1	Change engine oil and filter	5	4	3	2	1
5	4	3	2	1	Provide winter protection for ornamentals	5	4	3	2	1
5	4	3	2	1	Remove damaged tree limbs	5	4	3	2	1
5	4	3	2	1	Construct a fence	5	4	3	2	1
5	4	3	2	1	Safeguard trees in urban areas	5	4	3	2	1
5	4	3	2	1	Cable a weak tree limb	5	4	3	2	1
5	4	3	2	1	Adjust a time clock from "long day" to "short day" cycles	5	4	3	2	1
5	4	3	2	1	Rake a sand trap	5	4	3	2	1
5	4	3	2	1	Inventory dry goods	5	4	3	2	1
5	4	3	2	1	Make a dried arrangement	5	4	3	2	1
5	4	3	2	1	Install a heat circulating pump	5	4	3	2	1
5	4	3	2	1	Control scale insects on ferns	5	4	3	2	1
5	4	3	2	1	Cultivate a small fruit planting	5	4	3	2	1
5	4	3	2	1	Repair a leaking garden hose	5	4	3	2	1
5	4	3	2	1	Install an engine battery	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Identify and correct nutrient deficiency symptoms in a plant	5	4	3	2	1
5	4	3	2	1	Hitch towed equipment to a tractor	5	4	3	2	1
5	4	3	2	1	Refuel power units	5	4	3	2	1
5	4	3	2	1	Load a delivery truck	5	4	3	2	1
5	4	3	2	1	Pre-cool a bulb crop	5	4	3	2	1
5	4	3	2	1	Plant a ground cover	5	4	3	2	1
5	4	3	2	1	Prune a grape vine	5	4	3	2	1
5	4	3	2	1	Make a showcase display	5	4	3	2	1
5	4	3	2	1	Construct a wintering house for container nursery stock	5	4	3	2	1
5	4	3	2	1	Design a funeral basket or spray	5	4	3	2	1
5	4	3	2	1	Make a bow	5	4	3	2	1
5	4	3	2	1	Fertilize an outdoor rose bed	5	4	3	2	1
5	4	3	2	1	Set-up a wedding floral order	5	4	3	2	1
5	4	3	2	1	Dye cut flowers	5	4	3	2	1
5	4	3	2	1	Design a bud vase arrangement	5	4	3	2	1
5	4	3	2	1	Maintain a golf green	5	4	3	2	1
5	4	3	2	1	Read and reset a maximum-minimum thermometer	5	4	3	2	1
5	4	3	2	1	Trim a tree for utility clearance	5	4	3	2	1
5	4	3	2	1	Maintain a golf tee	5	4	3	2	1
5	4	3	2	1	Make a "family needs" analysis	5	4	3	2	1
5	4	3	2	1	Clean a floral refrigerator	5	4	3	2	1
5	4	3	2	1	Aerify a lawn	5	4	3	2	1
5	4	3	2	1	Eliminate rodents	5	4	3	2	1
5	4	3	2	1	Do acetylene welding	5	4	3	2	1
5	4	3	2	1	Regulate temperature of a cold storage unit	5	4	3	2	1
5	4	3	2	1	Install a shade cloth system	5	4	3	2	1
5	4	3	2	1	Operate frost control equipment in an orchard	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Install a fertilizer proportioner	5	4	3	2	1
5	4	3	2	1	Calibrate and operate a lawn fertilizer spreader	5	4	3	2	1
5	4	3	2	1	Set-up a Chapin (automated) irrigation system for a pot plant crop	5	4	3	2	1
5	4	3	2	1	Label a pot plant	5	4	3	2	1
5	4	3	2	1	Produce a fern crop from spores	5	4	3	2	1
5	4	3	2	1	Cord wood	5	4	3	2	1
5	4	3	2	1	Construct a cold frame	5	4	3	2	1
5	4	3	2	1	Repair greenhouse benches	5	4	3	2	1
5	4	3	2	1	Install a timed lighting system	5	4	3	2	1
5	4	3	2	1	Control soil erosion	5	4	3	2	1
5	4	3	2	1	Make a terrarium	5	4	3	2	1
5	4	3	2	1	Prune a dormant bramble (raspberry)	5	4	3	2	1
5	4	3	2	1	Construct a compost bin	5	4	3	2	1
5	4	3	2	1	Repair a fence	5	4	3	2	1
5	4	3	2	1	Make a dish garden	5	4	3	2	1
5	4	3	2	1	Construct a fence	5	4	3	2	1
5	4	3	2	1	Mix concrete	5	4	3	2	1
5	4	3	2	1	Operate a backhoe	5	4	3	2	1
5	4	3	2	1	Operate vacuum rake	5	4	3	2	1
5	4	3	2	1	Use a soil auger	5	4	3	2	1
5	4	3	2	1	Maintain soil shredding equipment	5	4	3	2	1
5	4	3	2	1	Control humidity with fans and humidifiers	5	4	3	2	1
5	4	3	2	1	Service heaters and boilers	5	4	3	2	1
5	4	3	2	1	Connect hydraulic equipment	5	4	3	2	1
5	4	3	2	1	Prune a fruit tree for maximum fruit production	5	4	3	2	1
5	4	3	2	1	Eradicate a mite infestation	5	4	3	2	1
5	4	3	2	1	Construct a temporary plastic greenhouse	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL				NOT NEEDED	*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL				NOT NEEDED
5	4	3	2	1	Maintain a vegetable garden to successful harvest	5	4	3	2	1
5	4	3	2	1	Plant a flower bed	5	4	3	2	1
5	4	3	2	1	Make a symmetrical centerpiece	5	4	3	2	1
5	4	3	2	1	Plant a bench of carnations	5	4	3	2	1
5	4	3	2	1	Disbud chrysanthemums	5	4	3	2	1
5	4	3	2	1	Sleeve a pot plant	5	4	3	2	1
5	4	3	2	1	Establish a tree farm	5	4	3	2	1
5	4	3	2	1	Control ventilation and cooling in a greenhouse	5	4	3	2	1
5	4	3	2	1	Identify and remove diseased plants	5	4	3	2	1
5	4	3	2	1	Spread topsoil	5	4	3	2	1
5	4	3	2	1	Repair an extension cord	5	4	3	2	1
5	4	3	2	1	Climb a tree	5	4	3	2	1
5	4	3	2	1	Correctly water a lawn	5	4	3	2	1
5	4	3	2	1	Make a window display	5	4	3	2	1
5	4	3	2	1	Wire a cut flower	5	4	3	2	1
5	4	3	2	1	Reset a cup on a golf green	5	4	3	2	1
5	4	3	2	1	Do electric welding	5	4	3	2	1
5	4	3	2	1	Calibrate a fertilizer proportioner	5	4	3	2	1
5	4	3	2	1	Construct greenhouse benches	5	4	3	2	1
5	4	3	2	1	Pour concrete	5	4	3	2	1
5	4	3	2	1	Repair a hydraulic system	5	4	3	2	1
5	4	3	2	1	Service a wedding	5	4	3	2	1
5	4	3	2	1	Take a telephone order for flowers	5	4	3	2	1
5	4	3	2	1	Identify 200 flower and vegetable crops	5	4	3	2	1
5	4	3	2	1	Plan a delivery route	5	4	3	2	1
5	4	3	2	1	Correctly sharpen a knife	5	4	3	2	1
5	4	3	2	1	Inventory nursery stock	5	4	3	2	1

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Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Stratify woody plant seeds	5	4	3	2	1
5	4	3	2	1	Use hand watering for a crop of pot plants	5	4	3	2	1
5	4	3	2	1	Space plants in a greenhouse bench or an outdoor bed	5	4	3	2	1
5	4	3	2	1	Fertilize a large tree	5	4	3	2	1
5	4	3	2	1	Plant bulbs outdoors	5	4	3	2	1
5	4	3	2	1	Distinguish abnormal plant growth	5	4	3	2	1
5	4	3	2	1	Recognize when to water plants in the landscape	5	4	3	2	1
5	4	3	2	1	Make a site analysis for a landscape	5	4	3	2	1
5	4	3	2	1	"Limb-up" a street tree crop in a nursery	5	4	3	2	1
5	4	3	2	1	Adjust a mist system for each developmental stage in a crop of cuttings	5	4	3	2	1
5	4	3	2	1	Calibrate the thermostat of a heating cable	5	4	3	2	1
5	4	3	2	1	Root cuttings of: hardwood, greenwood, and softwood material	5	4	3	2	1
5	4	3	2	1	Plan a one-year crop rotation for pot plants	5	4	3	2	1
5	4	3	2	1	Grow seedlings under artificial light	5	4	3	2	1
5	4	3	2	1	Plant 12 kinds of hanging basket plants	5	4	3	2	1
5	4	3	2	1	Identify common plant diseases	5	4	3	2	1
5	4	3	2	1	Bare-root a tree	5	4	3	2	1
5	4	3	2	1	Lay brick for a patio	5	4	3	2	1
5	4	3	2	1	Develop crop rotation plans	5	4	3	2	1
5	4	3	2	1	Appropriately use safety clothing (goggles, hard hat, boots, etc.)	5	4	3	2	1
5	4	3	2	1	Maintain an up-to-date horticultural library	5	4	3	2	1

PLEASE TURN TO NEXT PAGE

Code No. _____

Preservice Teacher MOST ESSENTIAL / NOT NEEDED					*PROFESSIONAL HORT. COMPETENCY	Inservice Teacher MOST ESSENTIAL / NOT NEEDED				
5	4	3	2	1	Properly store pesticides	5	4	3	2	1
5	4	3	2	1	Identify 25 fruit crops	5	4	3	2	1
5	4	3	2	1	Renovate a lawn	5	4	3	2	1
5	4	3	2	1	Identify common horticultural tools	5	4	3	2	1
5	4	3	2	1	Calibrate spray equipment	5	4	3	2	1
5	4	3	2	1	Understand and use cut flower market reports	5	4	3	2	1
5	4	3	2	1	Assist customers with plant sales	5	4	3	2	1
5	4	3	2	1	Identify common garden weeds	5	4	3	2	1
5	4	3	2	1	Properly handle crops after harvest	5	4	3	2	1
5	4	3	2	1	Know sources of information for identifying plants	5	4	3	2	1
5	4	3	2	1	Control the flowering dates of commercial crops	5	4	3	2	1
5	4	3	2	1	Install a fan and pad cooling systems	5	4	3	2	1
5	4	3	2	1	Measure available light for African violets	5	4	3	2	1
5	4	3	2	1	Operate a solubridge	5	4	3	2	1
5	4	3	2	1	Select appropriate grass seed mixtures for a variety of sites	5	4	3	2	1
5	4	3	2	1	Adjust soil pH (acidity or alkalinity)	5	4	3	2	1
5	4	3	2	1	Identify common insects	5	4	3	2	1
5	4	3	2	1	Prepare a seed flat for seeding	5	4	3	2	1
5	4	3	2	1	Identify common lawn grasses	5	4	3	2	1
5	4	3	2	1	Sharpen a lawn mower blade	5	4	3	2	1

END OF SURVEY

PLEASE MAIL BACK

MANY THANKS!!

COMMENTS HERE: